The Hong Kong University of Science and Technology

Department of Mathematics

<u>Seminar on Applied Mathematics</u>

Mathematical theory for Fano resonance in metallic structures with small holes

by

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<u>Abstract</u>

Fano resonance, which was initially recognized in quantum mechanics by Ugo Fano, has been extensively explored in photonics since the past decade due to its unique resonant feature of a sharp transition from total transmission to total reflection. Mathematically, Fano resonance is related to certain eigenvalues embedded in the continuum spectrum of the underlying differential operator when the Bloch wavenumber is zero and their perturbations as complex-valued resonances when the Bloch wavenumber becomes nonzero. For photonic structures, the quantitative studies of embedded eigenvalues mostly rely on numerical approaches. In this talk, based on layer potential technique and asymptotic analysis, I will present quantitative analysis of embedded eigenvalues and their perturbation as resonances for a periodic array of subwavelength metallic structure. From a quantitative analysis of the wave field for the scattering problem, a rigorous proof of Fano-type resonance phenomenon will be given. In addition, the field amplification at Fano resonance frequencies will be discussed.

Date: **Friday, 31 May 2019**
Time: **3:00p.m. – 4:00p.m.**
Venue: **Room 5510, Academic Building, (Lifts 25-26), HKUST**

All are welcome!